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infinitesimal quantities. It cannot however be so used unless it can be shown that no error will result from such use in the particular case. In this case when $a = \infty$, u = actual zero or an infinitesimal, that is $u = 0 \div a$ or some infinitesimal between $1 \div a$ and $-1 \div a$, these infinitesimals depending for their values upon a and x. And the rate at which these infinitesimals change their values is $du \div dx = \cos ax$, for all values of a and x.

When a is infinite, that is greater than any assignable number, then a is indeterminately great, and by consequence indeterminate; $\cos ax$ is the cosine of an arc in a given circle, the arc being as indeterminate as a, and therefore $\cos ax$ is indetermiate both in "form" and value, and from the given conditions can no more be affirmed to be zero than any other value between $+1$ and -1. There being no preference or reason for the termination of the arc ax in one part of the circumference rather than another. Mathematics having to deal with truth, like the "Scripture is of no private interpretation".

DIFFERENTIATION OF THE LOGARITHM OF A VARIABLE.

BY PROF. LABAN E. WARREN, COLBY UNIV., WATERVILLE, ME.

To differentiate the logarithm of a variable, let $y = e^x$;

$$\therefore x = \log_e y; \quad \therefore dx = d(\log_e y).$$

$$y + dy = e^{x+dx}, \quad dy = e^{x+dx} - e^x \text{ or } dy = e^x(e^{dx} - 1),$$

$$e^{dx} = 1 + dx + \frac{dx^2}{2!} + \frac{dx^3}{3!} + \&c., \text{ or } e^{dx} = 1 + dx;$$

$$dy = e^x(1 + dx - 1), \text{ or } dy = e^x dx = y dx, \text{ or } dx = dy \div y,$$

but $dx = d(\log_e y)$;

$$\therefore d(\log_e y) = dy \div y, \text{ differential of Napierian logarithm.}$$

$$\log_{10} y = m(\log_e y); \quad \therefore d(\log_{10} y) = m\, d(\log_e y);$$

$$\therefore d(\log_{10} y) = m\frac{dy}{y}, \text{ differential of common log.}$$

SOLUTIONS OF PROBLEMS NUMBER TWO.

SOLUTIONS of problems in No. 2 have been received as follows:

From Prof. L. G. Barbour, 434; Prof. W. P. Casey, 430, 431, 433; G. E. Curtis, 429, 434; Geo. Eastwood, 431; Wm. Hoover, 429, 430; Prof. P. H. Philbrick, 429, 430, 431, 433, 434; Prof. E. B. Seitz, 430, 431, 433, 435; Prof. J. Scheffer, 428, 430, 431, 433.